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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,127	10/13/2006	Takashi Ogawa	S005-5850 (PCT)	4057

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Bruce L. Adams
Adams & Wilks
17 Battery Place-Suite 1231
New York, NY 10004

EXAMINER	
PURINTON, BROOKE J	
ART UNIT	**PAPER NUMBER**
2881	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/590,127	OGAWA, TAKASHI	
	Examiner	**Art Unit**	
	Brooke Purinton	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _18 August 2006_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-3 and 7-9_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-3 and 7-9_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _18 August 2006_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 1, 2 and 3 are objected to because of the following informalities:

Claim 1 line 4 – electro beam should be electron beam

Claim 2, line 3 - electronic beam should be electron beam

Claims 2 and 3 are objected to because of the following informalities:

The term "reversal of contrast" in claim 2 or “reversal of a contrast” in claim 3 is indefinite since contrast is a relative difference between two objects. Reversing a relative difference does not have a concrete meaning when the claim does not specifically state more than one object to contrast with. What is the contrast relative to? Examiner will take this to mean that there is more than one object on the surface, such as in the cases discussed below.

Appropriate correction is required.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-3 and 7-9 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 11/410600. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious to one of ordinary skill in the art to use the method or apparatus of '600 for semiconductor observation, including semiconductors on which there are wiring or wire components or regions on which there are suspected defects which need to be located (i.e. positioning means), since those also benefit from observation.

10/590,127- Claim 9	11/410,600 – Claim 1
A semiconductor inspection method comprising:	irradiation position positioning method of a charged particle beam
a first step of irradiating a predetermined area of a sample surface of a semiconductor device on which a wiring pattern is formed with a first charged particle beam to charge the predetermined area	Irradiating a surface of a sample with a first charged particle beam to charge a certain region of the sample
a second step of irradiating a second charged particle beam charged oppositely to the first charged particles, in a desired pattern in the predetermined charged area	Irradiating at a constant position within the charged region with a second charged particle beam having polarity opposite to that of the first charged particle beam
characterized in that the change in the contrast on the sample surface after the second step from the time of the first step is observed by microscope using the first charged particle	Observing a change in contrast between the charged region irradiated with the first charged particle beam and the charged region irradiated with the second charged particle

beam.	beam with a microscope by use of the first charged particle [beam] to identify an irradiation position of the second charged particle beam based on the first charged particle beam

Claims 1-3 and 7-8 are rejected under the same grounds. Claim 9 was treated as being the most comprehensive It would have been obvious to use an SEM or FIB as any of the charged particle beams listed above, since they are known in the art.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Norimatsu (Japanese Patent Application Number 09101960 – Abstract attached to rejection as used) and Patterson et al. (United States Patent Application Publication Number 2005/0068052).

Regarding Claim 1, Norimatsu teaches a method, characterized by observing and analyzing ("observing a potential contrast image of the wiring," p2, l12-13) both the state of a sample surface which is irradiated by an electron beam or a positively charged ion beam to charge the sample surface ("an irradiation step of irradiating the wiring with an electron beam under the condition where the wiring is electrified to a negative potential," paragraph 2, line 5), and the change in the state when an area in a highly charged state is irradiated with an

oppositely charged ion beam or an electron beam (" a supplying step of supplying a positive voltage," p2, l9-11).

Norimatsu fails to teach that it is either microscopically being observed, or that it is a method used for semiconductor inspection.

Patterson et al. teach the observation of microcircuits ("defects in microcircuits," [002]) on semiconductors ("continuity defects of IC semiconductor devices," [008]) using voltage contrast technique much like the one of Norimatsu.

It would have been obvious to combine since Patterson et al. state that "many electrical defects in integrated circuit structures are identified in a typically generated voltage contrast image," [007] which indicates that the microscopic observations of semiconductors would respond to charge biasing as detailed in Norimatsu, and therefore it would be beneficial to use the technique in that context.

Regarding Claim 2, Norimatsu and Patterson et al. teach the method according to Claim 1, Norimatsu further teaches wherein a sample is irradiated with an electronic beam to negatively charge the sample ("an irradiation step of irradiating the wiring with an electron beam under the condition where the wiring is electrified to a negative potential," paragraph 2, line 5) and the sample is spot-irradiated with a positively charged ion beam (" a supplying step of supplying a positive voltage," p2, l9-11).

Patterson et al. teach a sample is observed by SEM ("this beam can be used in tight scanning mode, to scan not only the full surface of the first conducting component, but also the surrounding structures," [37]) and reversal of a contrast is observed with an SEM ("as noted above, what has been designated as the first beam directs low energy electrons at a voltage that results in the production of secondary electrons," [0038]) and explicitly state that "the provision of the alternating pulse dual offset beams is accomplished by any of several arrangements of

equipment," and also that one type " devices also are known as dual beam FIB-SEMS" ([0024], both).

It would have been obvious to combine the FIB-SEM of Patterson et al. with the method of Norimatsu, since using an SEM to make observations would have been a known technique and would provide the benefit of using already known technology and a method to improve the use thereof.

Regarding Claim 3, Norimatsu and Patterson et al. teach a semiconductor inspection method according to claim 1.

Norimatsu further teaches wherein a sample is irradiated with a positively charged ion beam to positively charge the sample (" a supplying step of supplying a positive voltage," p2, l9-11) the sample is spot-irradiated by a negatively charged electron beam, and reversal of contrast is observed ("an irradiation step of irradiating the wiring with an electron beam under the condition where the wiring is electrified to a negative potential," paragraph 2, line 5).

Patterson et al. teach a sample is observed by a charged particle beam ("this beam can be used in tight scanning mode, to scan not only the full surface of the first conducting component, but also the surrounding structures," [37]) and reversal of a contrast is observed with a charged particle beam ("as noted above, what has been designated as the first beam directs *low energy electrons* at a voltage that results in the production of secondary electrons," [0038], examiners emphasis) and explicitly state that "the provision of the alternating pulse dual offset beams is accomplished by any of several arrangements of equipment," and also that one type " devices also are known as dual beam FIB-SEMS" ([0024], both).

It would have been obvious to combine the FIB-SEM of Patterson et al. with the method of Norimatsu, since using an FIB to make observations of the reversal of contrast (using charged particles of low energy to create the backscattered electrons, as is known in the art, instead of using the low energy electrons emphasized above, which would have been an obvious

substitution of known parts) would have been a known technique and would provide the benefit of using already known technology and a method to improve the use thereof.

Also, it would have been obvious that either the negatively charged beam or the positively charged beam could be irradiated onto the sample first, because it is the difference between the two and not the order in which they are used that create the potential contrast image of the wiring of Norimatsu, not the order, and the potential contrast can be observed regardless of the order.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patterson et al..

Regarding Claim 7, Patterson et al. teach a semiconductor inspection system ("identify defects in microcircuits, such as are found on silicon wafer-based integrated circuits," [002]) comprising a composite apparatus ("dual beam," title) with a double function charged particle detector including an electron gun and an ion beam gun ("once the particular dual-beam SEM or FIB-SEM is selected ...." [0027]), wherein there are means for emitting charged particles from one of the guns to the surface of a sample ("pulses of electrons from the first beam" [0025]); for microscopic observation of the sample surface (the microcircuits on sample mentioned above, and "detecting secondary electrons from said first conducting component," Claim 1, part d); and for irradiation of a specific area with particles charged oppositely to the charged particles emitted from the other gun ("...and electrons (or ions) from the second beam," [0025], where ions can be negative or positive).

Patterson et al. fail to specify that the ions from the FIB are positive, however, this would have been an obvious design choice and would have yielded the predictable results of producing positive ions.

Regarding Claim 8, Patterson et al. teach a semiconductor inspection system according to claim 7.

They teach it further comprising: a means for obtaining position information of a specified area by a microscope ("examples of specific optical and mechanical alignment devices, arrangement of a laser interferometer for tracking alignment, stages, imaging systems..." [0027]); and a means for irradiating the position which is designated on the basis of the position information, with a specified particle beam ("when iterative positioning of both beams to their respective targets is done," [0018]).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patterson et al. in view of Uehara (Japanese Patent Application 06082507, abstract being attached).

Regarding claim 9, semiconductor inspection method comprising: a first step of irradiating a predetermined area of a sample surface of a semiconductor device on which a wiring pattern is formed ("first and second conducting component of an integrated circuit," claim 7, preamble) with a first charged particle beam to charge the predetermined area ("said first beam producing a net negative charge," Claim 7, part b); and a second step of irradiating a second charged particle beam, in a desired pattern in the predetermined charged area ("second beam imparts a virtual ground to said second conducting component," 7,b where the charged area is the total of the substrate region and the two conducting components being checked for continuity and the patterning is the other conducting component), characterized in that the change in the contrast on the sample surface after the second step from the time of the first step is observed by microscope using the first charged particle beam ("evaluating the pattern of said secondary electrons to determine whether said first conducting component has electrical continuity with said second conducting component," Claim 7, part d, where the pattern being

observed is from secondary electrons from the SEM which, since it alternatingly pulses, fulfills the limitation).

Patterson et al. fail to teach the second beam charged oppositely to the first charged particles.

Uehara et al. teach a second beam charged oppositely to the first charged particles ("irradiating one point of a wiring pattern with an electron beam while another point with a positive ion beam and then detecting emitted electrons," purpose).

It would have been obvious to combine the technique of Uehara et al. into the method of Patterson et al. since a simple substitution of a positive ion beam instead of a grounding second charged particle beam that Patterson et al. use would have yielded the predictable results of allowing the user to measure the potential drop or rise (as described in Uehara et al.'s abstract) to ascertain the continuity of the wiring or other conducting component being observed while still allowing the pulses of Patterson et al. to be used to avoid beam interference.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. A complete listing of these prior art patents is given in the notice of references cited, alongside the art referenced above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brooke Purinton whose telephone number is 571.270.5384. The examiner can normally be reached on Monday - Friday 7h30-5h00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571.272.2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Brooke Purinton
Examiner
Art Unit 2881
/B. P./
Examiner, Art Unit 2881

/ROBERT KIM/

Supervisory Patent Examiner, Art Unit 2881